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ABSTRACT

This report provides background and linkages necessary to bring state-level experiences of reporting graduation rate statistics to bear in implementing the Student Right-to-Know Act particularly regarding the reporting of student persistence and graduation rates at institutions of higher education. Section I provides: (1) an overview of the extent of state-level graduation rate reporting capabilities and the diversity among these existing data systems; (2) a more technical description of the types of data collected and reported, system designs and other major characteristics; and (3) a discussion of the uses, applications, effectiveness and future plans for these state-level student data systems. Section II provides more detailed information on the development and evolution of student data systems in seven states: Colorado, Florida, Minnesota, North Carolina, New Jersey, Tennessee and Wisconsin. All these states have well-developed student data systems, some of which date back to the early or mid-1970s, all have gone through several stages of system development and have adapted to new types of analysis and reporting requirements as these have emerged. An appendix contains a list of state-level contacts and agencies. (JB)

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Charles S. Lenth
Alene Bycer Russell

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November 1991

SHEEO

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Preface

States, it is said, are the laboratories of American politics and government. In domestic policy areas, state-level political issues often forecast national concerns, and the very diversity of state conditions and problem-solving approaches can provide experience and guidance to help bring about well-informed federal action. One corollary of this observation is that new federal laws often have antecedents at the state level — in the issues and laws that emerge in the laboratories and legislatures of our decentralized political system.

On the surface, the federal Student Right-to-Know and Campus Security Act of 1990 appears to be a textbook example of this corollary of American politics. This new law requiring all postsecondary institutions that receive Title IV funds to disclose statistics on graduation rates and campus crimes has clear precursors at the state level. In fact, state-level interest in graduation rate statistics has been growing steadily over two decades, as has state-level interest in campus crime statistics. State reporting capacities and activity are also increasing rapidly. Where this case diverges from the state laboratory model, however, is that the new federal Student Right-to-Know law does not explicitly acknowledge what is in place at the state level or build upon what has been learned. It seems as if the federal legislation has emerged from state practice, but the experience, the methods, and lessons learned have been left back in the laboratories.

This report provides background and linkages necessary to bring state-level experience to bear in implementing the Student Right-to-Know Act, particularly regarding the reporting of student persistence and graduation rates. A companion report, Assessing and Reporting Student Progress: A Response to the "New Accountability," by Peter T. Ewell and Dennis P. Jones, provides the conceptual and more technical framework for facilitating these linkages using

uniform definitions, methods and reporting formats. Both reports are intended to assist those agencies and individuals responsible for implementing the new federal legislation, to inform them of the reporting capabilities, data systems, data uses and other relevant resources that exist at the state level. These reports are also intended for those at the state or institutional levels who will play roles in implementing and reporting data for the Student Right-to-Know Act; they face the immediate challenges of providing statistics that are meaningful and useful to students, the public, and policy makers.

This report as well as the companion Ewell/Jones paper are part of the joint activities of the State Higher Education Executive Officers (SHEEO), the SHEEO member organizations in each state, and the National Center for Education Statistics (NCES) to foster and support federal-state cooperation in data collection and dissemination on postsecondary education. Many of the existing data collection activities, such as the Integrated Postsecondary Education Data System (IPEDS), depend on voluntary state participation as well as NCES direction and administration to provide the core national data. As these ongoing data collection activities demonstrate, it is in the interest of federal as well as state agencies to make the connections necessary to achieve comparable and consistent data across states and to reduce redundant data collection and reporting. In the increasingly prominent area of reporting graduation rates and other student outcomes, such coordination is essential if we are to provide statistics that are useful in informing student enrollment decisions and helpful in achieving long-term improvement in higher education.

I. Introduction: The Student Right-to-Know and the State Capacity to Report

The Student Right-to-Know and Campus Security Act was passed by Congress and signed into law by the President in November 1990. This law emerged from several versions of legislation introduced into Congress to address growing public concern in three areas. First, there were concerns about abuses in intercollegiate athletic programs, based on anecdotal evidence of poor academic preparation and low graduation rates for college athletes. More systematic statistics on the academic performance of athletes were needed in order to document the extent of such problems and to bring pressure to bear on institutions to improve their practices. Second, there was an an underlying desire for general "student outcomes" measures at the postsecondary level, emerging from a concern that both low graduation rates and long "time to degree" were not consistent with public expectations of postsecondary performance. Public disclosure of these statistics would, it was assumed, contribute to corrective changes in institutional and student behavior. Third, the apparent increases in the incidence of campus crimes and attendant media coverage led to proposals for full public disclosure of these statistics and campus security policies.

These three areas of concern were linked together and addressed in a single piece of legislation under the rubric of the "student right-to-know." The title and the underlying rationale are significant in that the emphasis of the legislation in all three areas is public disclosure and the presumed effects of these disclosures on behavior. As stated explicitly in the introductory language to the legislation:

> The Congress finds that.... knowledge of graduation rates would help prospective students and prospective student athletes make an informed judgment about the educational benefits available at a given institution of higher education.[1]

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[1] The Student Right-to-Know and Campus Security Act of 1990 (P.L. 101-542).

No explicit guidance or standards are provided in the legislation to define what appropriate graduation rates are, or to require improvement in these rates. Instead, the standards and mechanisms to force compliance with the provisions of the Student Right-to-Know Act all focus on public disclosure and reporting requirements. The only sanction built into the new federal law is that unless the specified reporting procedures and schedules are met, institutions may be determined ineligible to receive federal Title IV funds for student financial aid. Aside from other limited responsibilities for feasibility studies and exemplary program reports, neither the Secretary nor any other agencies are given authority to define or enforce standards for improvement.

Specifically, the Student Right-to-Know Act will require postsecondary institutions to compile and report statistics in the following three areas:

- Section 103 requires regular disclosure by all institutions of the proportion of full-time entering undergraduate students who complete a degree or certification program within 150% of "normal time." This completion rate may include students who, after leaving the institution subsequently "enrolled in any program of an eligible institution for which the prior program provides substantial preparation."[2] The compilation of these statistics must begin with students entering after July 1, 1991. The statistics must be provided to students and others annually beginning July 1, 1993.
- Section 104, which applies only to institutions that provide financial assistance for student athletes, requires more detailed reporting of graduation rates by race, sex, and major sports for athletic aid recipients and, for comparison, the remainder of the student body for the most recent four graduating classes. Unlike simple disclosure under Section 103, the statistics must be reported to the U.S. Secretary of Education

[2] P.L. 101-542. The clarification of "undergraduate" students was made in P.L. 102-26.

by July 1, 1993, unless a waiver is granted by the Secretary for this reporting to be done through athletic conference associations.

- Sections 203 and 204 concern disclosure and publication of campus-based crimes and security policies. To be in compliance, campuses must begin compiling crime statistics (using Department of Justice definitions) by September 1, 1991 and provide published reports upon request beginning September 1, 1992.

These public disclosure and reporting requirements are directed solely at institutions, even though many state higher education agencies and multi-institution governing boards already report or maintain data bases relevant to student persistence, attrition or completion rates for the institutions under their jurisdiction. This lack of attention to existing state activities raises several issues relevant to the implementation of the Student Right-to-Know law:

1. Overall state capacity, expertise, and relevance to Student Right-to-Know How extensive is the existing capacity at the state level or multi-institution system level to compile and report statistics on postsecondary student progress and degree completion? What is the history and experience behind the development of existing data systems and reporting capacity? What can be learned from this experience that may assist in the implementation of the Student Right-to-Know Act?
2. Comprehensiveness of existing state systems What institutions and students are included in existing state reporting systems? How can or should this coverage be expanded to include private institutions and others who must also report under the Student Right-to-Know Act? What types of data are collected in statewide or system-wide student data systems? For what purposes have these data systems been established and what uses do they serve?
3. Advantages of state involvement What linkages could be formed between existing systems and the new reporting requirements in order to minimize redundant or

inconsistent data? How can multi-institutional reporting better address the issue of student transfers under Section 103?

4. Readiness of state systems for Student Right-to-Know Are the data systems in place usable for reporting the statistics required under the Student Right-to-Know Act? Are state higher education agencies or multi-system offices interested in reporting the required data or assisting reporting by their institutions?

This report provides information and guidance to help explore these issues. The information has been provided by SHEEO member organizations and other higher education agencies in all 50 states, Puerto Rico and Washington, D.C. Section I provides first, an overview of the extent of state-level graduation rate reporting capabilities and the diversity among these existing data systems; second, a more technical description of the types of data collected and reported, system designs and other major characteristics; and, third, a discussion of the uses, applications, effectiveness and future plans for these state-level student data systems.

Section II provides the more detailed information on the development and evolution of student data systems in seven states: Colorado, Florida, Minnesota, North Carolina, New Jersey, Tennessee and Wisconsin. These seven states are themselves quite diverse, but all have well-developed student data systems, some of which date back to the early or mid-1970s. All, too, have gone through several stages of system development and have adapted to new types of analysis and reporting requirements as these have emerged. For those wishing additional information on individual state systems and capacities, the appendix contains a list of state-level contacts and agencies.

II. Overview of Statewide Capabilities to Report Graduation Rates

Since the 1970s, state-level higher education coordinating agencies and governing boards have gained substantial experience in collecting, analyzing and reporting student-level data on enrollment, demographic characteristics, residence and migration patterns, course-taking patterns, and many other areas of student life. Pioneered by those states with centralized governance of public higher education (a single state governing board) or substantial coordinating authority, the number of states engaged in centralized student data collection and analysis grew slowly but steadily through the 1980s. Despite this growth, the number of fully-operational state-level or system-wide student data bases remains relatively small, and the coverage of these systems, in terms of which institutions are included and what types of analysis or reporting are provided, varies significantly.

The Emergence of Student Data Systems

For the most part, early statewide (and system-wide) efforts consisted of the collection and reporting of aggregate data from public institutions under their jurisdictions. Although still based upon multiple and varied information systems residing at the institutional level, the common definitions and reporting formats that were established represented a major step forward in the production of comparable and meaningful statistics across institutions. In response to new demands for information related to state accountability or management, and in part a reflection of computer advances which made centralized data bases more practical to operate, many states took this process a step further by developing their own multi-institutional student level data bases. Developed as an extension of the aggregate collection of enrollment statistics, these data bases afforded state- and system-level policy analysts greater flexibility in their research, informational, and policy support functions. Finally, some states have taken the additional step

of using these multi-institutional, multi-year student data bases to track student progress through college at the state level.

Few of these state-level student data bases were started with the intention of analyzing and reporting graduation rates. They were, in this sense, true "laboratories" of data system development, and their experiences and growing knowledge bases took them in many new directions. For example, the University of Wisconsin System data base was established in the early 1970s in conjunction with changes in the governance structure in that state which brought all four-year public institutions and campuses and two-year academic programs under a single governing board. A system-wide student data base was viewed as an important component and responsibility of the central administration — a component which was necessary to provide operational information as well as to meet planning and policy needs. When an interest in graduation rates emerged, the basic system capabilities were expanded to include tracking of new freshmen to graduation. In Tennessee, a student data base for all public institutions was established in the 1970s in conjunction with the development of "performance funding" by the Tennessee Higher Education Commission. Over the years, the use of this data base to calculate persistence and graduation rates has become increasingly important in response to changes in the criteria for performance funding and a variety of external pressures. Other states have followed different paths and have not (yet) developed tracking capabilities at the state level. They may, however, collect completion statistics from institutions and report them in useful comparative formats. Each state data system illustrates a somewhat different set of needs and pattern of development.

Overall, however, two distinct trends in state development and use of student-level data systems are apparent. First, an increasing number of state coordinating or governing boards have established (or are currently developing) multi-institution student data bases to meet a variety of

information and analytic needs. Second, with or without these centralized data bases, there is a strong interest at the state level in analyzing student persistence, inter-institutional transfer, and completion or graduation rates. Much of this interest is related to the growing concern for student outcomes data, institutional accountability and factors related to system-level effectiveness.

Table 1 shows the overall status of statewide student data systems, specifically with respect to the capability to report graduation rates. As of early 1991, 19 states currently maintain statewide or system-wide student data systems using which they can (and generally do) report graduation rates for their institutions. Among these 19 states, it is important to note that several have multiple statewide systems, each containing data from a particular sector or governing board, and that the institutions included in the systems vary significantly. Also, not all of these reporting systems are based on statewide data bases. In short, the system design, coverage and capabilities vary substantially among these 19 states.

Thirty-one states, the District of Columbia and Puerto Rico do not currently have the capacity to report graduation rates (Table 1, groups B, C and D). These jurisdictions also illustrate very different capacity and interest in this area. Eight of these states, in fact, have a student data system in place, but do not currently have the capacity or procedures established to track students to completion or graduation. Several of these states, however, are conducting retention and transfer studies, and as more years of data are accumulated, will be able to track to completion. Another 12 of these 33 jurisdictions are currently planning and developing student data systems with the capacity to report graduation rates. This means that only 12 states and the District of Columbia do not have any current capabilities in this area and do not have plans in place to develop such reporting capabilities.

TABLE 1
OVERALL STATUS OF STATEWIDE STUDENT DATA SYSTEMS*

Overall Status	States	
A. Student data system in place; presently reporting graduation/ completion rates (N=19)	Arizona	Montana
	Florida	New York
	Georgia	North Carolina
	Indiana	Oklahoma
	Iowa	Tennessee
	Kansas	Virginia
	Kentucky	Washington
	Louisiana	West Virginia
	Maryland	Wisconsin
	Mississippi	
B. Student data system in place; presently developing capacity to report graduation/completion rates (N=8)	California	Minnesota
	Colorado	New Jersey
	Connecticut	New Mexico
	Massachusetts	Texas
C. Planning to develop capacity to report graduation/completion rates in the near future (N=12)	Alaska	Nevada
	Arkansas	Oregon
	Hawaii	Puerto Rico
	Illinois	South Carolina
	Maine	South Dakota
	Missouri	Wyoming
D. No current plans for reporting graduation/completion rates (N=13)	Alabama	North Dakota
	Delaware	Ohio
	District of Columbia	Pennsylvania
	Idaho	Rhode Island
	Michigan	Utah
	Nebraska	Vermont
	New Hampshire	

*This status report is as of early 1991. Colorado and perhaps other states plan to have reporting capabilities in place by early 1992.

Since extensive changes and development in these state-level systems are occurring at the present time in response to both state and federal data and reporting needs, the "counts" as well as the status of individual states are likely to continue to change. In any case, as summarized in Table 1, 39 of 52 states or jurisdictions will have some reporting capabilities within the next

several years. One factor to keep in mind, however, is that for those states just beginning to develop data systems, it may actually be a decade or more until they have sufficient years of data accumulated to produce completion rates; in the meantime, retention or transfer studies which do not require as many years of data may be possible.

Among those states with existing or planned reporting systems (39 in total), the majority include all public institutions. More specifically:

- 22 states include all public four-year and two-year institutions in their reporting systems;
- 6 states include all four-year public colleges only and 1 state includes all two-year public colleges only;
- 4 states include most public four-year and two-year institutions in their reporting systems, with coverage uneven across the sectors or data from an occasional college missing;
- 6 states include only some public institutions in their current or planned systems, and do not intend the system to be comprehensive.

In terms of other types of institutions, only five states currently include private, degree-granting institutions in their state reporting systems, and three may do so in the future. Only three states include private, less-than-two-year institutions in their state reporting systems, and one other state may do so in the future. Clearly, this is not a significant piece of the existing statewide reporting picture and is not likely to become so in the near future.

In sum, viewed as a proportion of all states in the country, more than half currently have or have under development a comprehensive system for reporting graduation rates for all or most public institutions. Compared to a decade ago, this is a significant development, and the expertise developed in this area should not be ignored. However, the nation as a whole is still a long way away from a situation in which every state has the capability to report graduation rates for its colleges, particularly if this includes private institutions.

Data System Characteristics

State-level data systems which are used to report graduation rates have been developed using two basic configurations, each of which has several variations. In centralized data bases, or student unit-record systems, information on each postsecondary student enrolled at any of the participating institutions is maintained as part of a centralized data base. Typically, one record is established for each student the first time he/she registers, and data are added in new files each semester, quarter or academic year for as long as the student is enrolled, including re-enrollment after withdrawal. Using student social security numbers as key matching fields, the term data sets are matched and merged across years for longitudinal analysis. In this case, the state or system office collects the basic student data files from institutions, and carries out the longitudinal linking and analysis of student records; institutions themselves need not have any tracking capability. One variation of this occurs where separate statewide systems are linked. In Florida, for example, the State Board of Community Colleges and the State University System maintain separate student data systems that are linked and analyzed at the state level. Centralized student unit-record systems provide considerable flexibility in analyzing student data, specifically in following student enrollment patterns across institutions from entrance to completion. The more comprehensive these systems are, in terms of number and types of institutions, the more powerful is the tracking capability.

The second major type of statewide data system involves the establishment of statewide common definitions and reporting formats, and statewide analysis and reporting. Decentralized data sets are maintained at the institution level, and the state or system offices collect aggregate reports from them. In these cases, institutions themselves must have a tracking capability, and statewide offices work with "totals" prepared by institutions, not with actual student data records.

Inter-institutional tracking is necessarily more limited, and state offices are dependent on the willingness and capabilities of institutions to track students.

Of those states with current capabilities to report graduation rates, 12 out of 19 use a state- or system-level student unit-record system (see Table 2). The remaining seven states use some form of institution-based data system using common statewide definitions for those data reported to the state level. Among the 20 states currently developing their data systems or their capacity to report graduation rates from existing data sets, 12 use or will use centralized student unit-record systems. Of the eight additional states, four will use institution-based systems with common statewide definitions. Assuming the full implementation of the planned data systems and reporting capacities, 23 states and Puerto Rico (24 out of a total of 52) will have a centralized student unit-record system which can be used to analyze graduation rates.

TABLE 2
STATEWIDE STUDENT DATA SYSTEMS
BY TYPE OF DATA SYSTEM

Overall Status	Type of Data System					
	Student Unit Record System	Institution-Based System; Common Statewide Definitions	Instiution-Based System; No Statewide Definitions	Other	Unknown or Not Applicable	Totals
A. Student data system in place; presently reporting graduation/ completion rates	12	7	0	0	0	19
B. Student data system in place; presently developing capacity to report graduation/completion rates	6	1	0	0	1	8
C. Planning to develop capacity to report graduation/completion rates in the near future	6	3	2	1	0	12
D. No current plans for reporting graduation/completion rates	NA	NA	NA	NA	13	13
TOTALS	24	11	2	1	14	52

Within these systems, there is considerable variability in the content of the student data. Table 3 lists the major types of data on students analyzed in state-level reporting systems. Nearly all systems report data by sex and race/ethnicity, and most report on attendance status, age, major field or discipline and state residency status. Beyond these core data elements there is considerable variability. A significant proportion address the areas of academic status (mainly participation in remedial coursework) and financial aid status, although few can identify the school or program within an institution in which a student is enrolled or the income of students. Nine out of 35 systems can report some data on the receipt of athletically-related financial assistance. Clearly, there is significant variability in what these data systems address, and many of these systems have altered or expanded their data elements over time in order to meet new analytic or reporting needs.

Which students are entered into the data base and how "enrollment" is defined directly affect the types of analysis and reporting that can be undertaken. Across these important dimensions, there is also considerable variability in the existing state systems. As indicated on Table 4, most state systems use some standard definition for the entering student cohort, and nearly all can identify and track first-time, full-time enrolled students. However, many began their systems thinking this was all they wanted to study, and have since expanded their interests. Many have defined other kinds of standard cohorts to be tracked, and some have computer systems that allow them to define additional cohorts as needed. Also, the issue of degree-seeking students is variable: a majority of states include all credit registrations in their systems, not just degree-seeking students; however, they may be able to define and track only those seeking degrees. Similarly, a majority include all full-time and part-time students in their systems, but may be able to define and track a full-time cohort. Indeed, there is also great variety in the complexity and the flexibility of computer systems to respond to new interests as they arise.

TABLE 3
SPECIFIC STUDENT CHARACTERISTICS USED IN STATE GRADUATION/COMPLETION RATES

Student Characteristic	States Presently Reporting Graduation/ Completion Rates (of 18 responding)	States Presently Developing of Planning to Develop Capacity to Report Graduation Rates (of 17 responding)	Totals (of 35 responding)
Sex	16	17	33
Race/ethnicity	17	17	34
Attendance status (full- or part-time	11	15	26
Age	12	14	26
Income	1	2	3
Major field of study or academic discipline	13	14	27
School within institution	1	5	6
Athletically-related student aid	4	5	9
Financial aid status	6	5	11
Residency status (in-state or out-of-state)	15	13	28
Participation in remedial coursework	8	8	16
High school of origin	11	10	21

TABLE 4
STATE SYSTEM COHORT DEFINITIONS

	States Presently Reporting Graduation/ Completion Rates	States Presently Developing or Planning to Develop Capacity to Report Graduation Rates	Totals
Reports use standard definition for student cohorts	18	10	28
Reports do not use standard definition for student cohorts	1	3	4
First-time, first-year full-time enrollment can be tracked	16	8	24
Other entering cohort definition used	2	1	3
All credit registrations in cohort	9	6	15
Degree-seeking students only in cohort	8	3	11
Full-time and part-time students in cohort	8	7	15
Full-time students only in cohort	6	2	8

Uses of State-Level Reporting Systems

As indicated earlier, the state student data systems established during the 1970s were intended to serve many purposes related to enrollment planning and management, the allocation of state resources and other state policy or management functions. All served some research or policy need existing at the state level that separate institutional reporting could not address, even though the forms these systems took, and the uses they served, varied a great deal across states.

As shown in Table 5, nearly all existing or planned data systems allow states to develop a statewide or system-wide graduation rate and to compare graduation rates across institutions. Most of these systems have the capacity to report graduation rates by specific student

characteristics (as listed in Table 3). Of those states or systems with capabilities to report graduation rates, all data systems that include four-year institutions track students through to completion of the baccalaureate degree. Twenty-four of 31 responding states report graduation rates at the associate degree level, and 17 of 31 states report program completion at the certificate (less-than-two-year) level.

TABLE 5
USES OF STATE REPORTING SYSTEMS

Use	States Presently Reporting Graduation/ Completion Rates (of 18-19 responding)	States Presently Developing or Planning to Develop Capacity to Report Graduation Rates (of 16-18 responding)	Totals (of 34-37 responding)
1. To develop statewide/ system-wide graduation/ completion rates	17	15	32
2. To compare graduation/ completion rates across institutions	19	16	35
3. To develop graduation/ completion rates by specific student characteristics	18	17	35
4. To track student flow or transfers across institutions or sectors	15	15	30
5. To track post-college outcomes, such as job placement, job-skill match, or student licensure or certification	2	5	7

At least 30 states have or are developing the capacity to analyze student transfers or to track student flow across institutions. As indicated on Table 6, these capabilities are most widespread for four-year public institutions (in-state), with 28 states reporting this capability. Twenty-two states are developing the capability to track students across two-year public institutions, and generally between two-year and four-year institutions. Only five states, however, report the capability to report transfers to or from in-state private institutions — with three such systems in place and two under development. No state or system data bases currently have the capacity to track students to out-of-state institutions.

TABLE 6
STATE CAPABILITIES TO TRACK STUDENTS AMONG INSTITUTIONAL SECTORS

Tracking Possible Within:	States Presently Reporting Graduation/ Completion Rates (of 19 responding)	States Presently Developing or Planning to Develop Capacity to Report Graduation Rates (of 13 responding)	Totals (of 32 responding)
Four-year public institutions (in-state)	16	12	28
Two-year public institutions (in-state)	11	11	22
Private institutions (in-state)	3	2	5
Out-of-state institutions	0	0	0

A small but growing number of states also use student data systems to track college graduates into the workplace or to monitor professional licensure or other post-graduation outcomes. The Florida student data system, for example, is periodically matched with state employment records to analyze employment trends and outcomes for college graduates. In at

least four other states, separate surveys have been initiated to gather data on graduate education, employment, college satisfaction and other areas from recent college graduates. There appears to be a growing interest in defining student outcomes more broadly than program completion, for students in vocational areas as well as graduate education and the professions.

In terms of the purposes or needs being served by these graduation reporting systems, states were asked to rank five different purposes from "very important" to "not important." The mean scores for the 39 states with existing or planned reporting capabilities are given in Table 7. It is quite clear that accountability issues are the most important ones among those developing such reporting systems, and that these kinds of concerns often provided the impetus to the development of statewide student data systems. Program review, monitoring transfers across institutions, and consumer information/public accountability are somewhat less important. Only resource allocation tends toward the "not important" side, perhaps logically so, since student tracking outcomes are less related to institutional expenditures than are the more basic enrollment statistics.

TABLE 7
RELATIVE IMPORTANCE OF DIFFERENT PURPOSES
FOR GRADUATION RATE REPORTING

Purpose	Mean Score (on scale of 1=not important to 4=very important)
Legislative/governing board accountability	3.37
Program and institutional review/evaluation	
To monitor transfers across institutions	2.94
Consumer information/public accountability	2.94
As a factor in resource allocation	1.78

Two important observations emerge from this overview of state data system capabilities. First, the diverse data system capabilities and resulting state roles in the areas of tracking student persistence, graduation and other outcomes have evolved over a period of years and, now, in many cases both strengthen and go beyond individual institutional capabilities. In particular, the tracking issues that go beyond the scope of one college — those involving the transfer of students, often across sectors (four-year and two-year) — are best addressed by statewide student data bases. But even states that do not have statewide student unit-record systems — those that engage instead in coordinating and standardizing institutional tracking efforts and in reporting consistent statewide statistics — still surpass separate institutional efforts in providing consistent and comparable statistics over a range of student outcomes.

Second, the fact that many state agencies have already invested heavily in the development of these data and reporting systems should not be disregarded in establishing a national framework for reporting these statistics. The state agencies will not simply discontinue these programs or have them displaced by more general federal reporting requirements and analytic capabilities. Without some coordination definitions and reporting capabilities, this is likely to result in redundant and, perhaps, inconsistent reporting of graduation and persistence rates. Furthermore, at least some of the state data systems have demonstrated cost savings and other efficiencies, as evidenced by an increased willingness of institutions — public and in some cases private — to participate in statewide student data systems. These benefits could also be lost without appropriate linkages to existing state-level reporting capabilities.

III. State Data System Profiles

This section contains brief profiles of the data systems used to compile and report postsecondary persistence and completion rates and other student data in seven states: Colorado, Florida, Minnesota, New Jersey, North Carolina, Tennessee and Wisconsin. The information was obtained from individuals in each of these states who are responsible for the development or operation of these data systems. Their names and agency addresses are provided in the list of state contacts in Appendix B. Requests for additional information and more specific technical questions should be addressed directly to these individuals.

Each state profile provides (1) a brief description of the origins and development of the state-level data system; (2) an overview of the system capabilities and uses; (3) an assessment of the problems and potential of the data system, based primarily on the comments of the state respondents; and (4) a summary of future plans and applications. The profiles are intended as a resource for state-level higher education agencies and boards who are in the process of developing such reporting systems, and for the U.S. Department of Education and others who must implement the Student Right-to-Know and Campus Security Act of 1990. States with existing reporting capacities may also find these profiles helpful in reviewing and updating their systems, since it is often useful to share system designs and to establish comparability in the reported data.

Although the details of each state's experience and system design are quite different, a general theme emerges from these profiles. In all seven states — and this is true in others as well — student data bases have evolved over an extended period of time. While the technology is fairly straightforward, the need to draw consistent data from many institutional and campus locations on a diverse statewide student body has typically involved a process of negotiation with the institutions, refinement and eventual routinization that occurred over a period of years.

Moreover, during the evolution of the data system, new technologies and additional needs have emerged, which means the systems are operating while continuing to evolve and develop. Such a developmental process requires well-defined state coordinating or governing roles which both support and draw strength from the student level data bases. The experiences of these seven states may provide useful guidance for those states now undertaking or contemplating the development of such statewide data bases.

Colorado SURDS and CTS

Origins and Development

The existing student tracking system maintained by the Colorado Commission on Higher Education (CCHE) is the result of two distinct phases of development: the initiation of the Student Unit-Record Data System (SURDS) in 1985 and its augmentation through the Cohort Tracking System (CTS) in 1989. Although the second phase was dependent on the first, it was not part of a long-term plan envisioned at the outset of the first phase. Success in the first phase of the process, as indicated by the growing volume of data available, contributed to the second phase.

Before 1985, the Colorado Commission on Higher Education had a very limited data collection system. In that year, as part of a legislative package to restructure the financing of higher education (HB 1187), all public postsecondary institutions were required to participate in the new Student Unit-Record Data System (SURDS) being developed by CCHE. This coincided with the introduction of the new federal Integrated Postsecondary Educational Data System (IPEDS), and would enable the state to coordinate data collection from all public institutions for submission to the federal government. Another part of HB 1187 adopted a set of statewide affirmative action initiatives; statewide data would be needed to evaluate progress on these

initiatives. In this context, SURDS was established to develop a common methodology for data collection in all institutions, to collect the data centrally, and to produce complete and consistent data to make possible comprehensive analysis of enrollment trends over time.

From the beginning, a Data Advisory Group consisting of data experts from the six governing boards, institutional representatives, and staff from other relevant state agencies worked with CCHE staff to guide the development of SURDS. As the system advanced, interest in tracking students over time and in minority achievement in the state grew. After several years of use, it became apparent that the system was limited by hardware and human resource constraints. The mainframe-based system was not easy to manipulate, and the inflexibility of the system limited responses to strategic or immediate issues.

In 1989 external support became available to CCHE in the form of a Ford Foundation Minority Student Achievement Grant awarded by the State Higher Education Executive Officers (SHEEO). This grant was used in part to develop and implement a student tracking system to promote minority student achievement in the state. CCHE staff, working with consultants, determined that available tracking systems would not work within the limitations of the existing system design, and that a customized system had to be developed. During the first year of the grant, CCHE undertook a study of user needs, analyzed the existing system, explored alternative solutions, designed a new system, and did an initial evaluation of the new Cohort Tracking System.

As it emerged, SURDS provided the source data to the new system, which defined it, processed it, and saved the data into specified extract files. As the system was tested and modified, specific retention measures were developed. During the pilot year of operation (1989-1900), three years of data were loaded into the system. This resulted in approximately 175,000 master records or unduplicated students in the system. After the first year of use, the Cohort

Tracking System was evaluated and documented. One change that was made at this time was the decision to collect data from spring and summer terms as well as from the fall term. Additional selection criteria for extract files were added to increase the flexibility of CTS. All 28 public institutions in Colorado are included in SURDS and CTS (including 13 four-year colleges and universities and 15 community colleges). As of 1991, five years of data are available. Private institutions in the state have recently decided to come into the system, and this segment of the system should be complete within a year.

Current System Capabilities and Uses

The Student Unit-Record Data System is composed of four files: student enrollment, degrees granted, undergraduate applicant and financial aid. Each file contains common information and detail information. The common information includes student identification, demographic data (sex, date of birth and ethnicity), and enrollment information (student level, tuition classification and major). The enrollment file alone contains data on year of high school graduation, credit hours, GPA and program type; this data is entered every semester. The degrees-granted file holds information on degree granted and program type and is collected once a year. The undergraduate applicant file contains high school code and GPA, ACT and SAT scores, and transfer information; these data are collected every term for four-year colleges only. The financial aid file includes family budget data and numerous categories of student aid; this information is collected each fall for the preceding fiscal year. The files are linked together by identification codes so that diverse information can be included in a single report or analysis.

Based on the SURDS data described above, the Cohort Tracking System (CTS) provides additional capabilities for tracking students over time. Through the creation of extract files based on a wide range of selection criteria, students can be tracked from both point of entry or point of exit. Data are downloaded from the mainframe computer into a more user-friendly Local Area

Network. A very powerful query language is available for fast, interactive analysis. A series of retention measures have been developed, which include both measures of within-school retention and within-system retention for both four-year and two-year institutions. It is possible to produce both institutional graduation rates and graduation rates for students transferring anywhere within the state of Colorado. Measures for minority student retention have been studied in particular.

The Colorado Commission on Higher Education uses the information provided through SURDS to support decisions in system-wide accountability, program management, strategic planning and policy monitoring. Since 1985, the SURDS data have been used for many purposes, including:

- compiling general statistical descriptions of Colorado postsecondary education;
- assisting the Colorado General Assembly with timely and accurate reports in support of statewide policy decisions;
- providing the supporting data necessary to evaluate the potential impact of CCHE policies;
- analyzing selected subgroups of students, such as minority students;
- analyzing the long-term effects of higher education policies; and
- centralizing and simplifying federal IPEDS reporting.

Specific applications include enrollment projections, analysis of admissions standards, and studies of origins and transfer patterns in the state. In 1991, CCHE published its first annual Scorecard on Public Higher Education: How the Public Higher Education System and its Students Perform on Selected Measures. This document uses 15 measures to evaluate the system's effectiveness in four system-wide educational values: educational excellence, educational access and diversity, efficiency in the delivery of education and adequate resources for the delivery of education. Currently CCHE is developing a Colorado digest of education

statistics that will summarize the large quantity of data available from the state system. Also, CCHE is beginning to provide institutions with data tapes and technical assistance so they can make use of the resources available at the state level. These developments mark the maturation and routinization of the basic SURDS data system begun in 1985, although the newer CTS system has not yet reached the same level of maturity.

Overall Assessment

Since its initiation in 1985, SURDS has provided the following benefits to CCHE and institutions in the state.

- The data collection burden on institutions is minimized since only a primary file is requested from CCHE, rather than multiple data requests as needs arise.
- There is greater flexibility in using information collected, allowing CCHE to be more responsive to new policy questions and issues. Unit-record data which are aggregated by CCHE are multiple-use oriented; this contrasts with a system in which institutions provide aggregate data which are specific, single-result oriented. Thus, CCHE is not constrained by pre-determined report categories in its analyses.
- The same data source is used for federal reports, state reports and CCHE analyses.
- There is an ability to link diverse files so that an analysis can be understood within the total postsecondary education context.
- Common data definitions provide for file and field consistency across institutions.
- Error correction is simplified since inclusion of a student ID number allows a single record with an error to be updated, rather than replacing the whole file.
- Trend reports and student profiles by subgroups are possible.

The first point above is an important one, and CCHE has noted that one of the reasons for success of the system is that there are mutual benefits to both institutions and the commission. While institutions may have been forced into cooperating at the outset, they are now willing and enthusiastic participants. Good communication, continuity of staff at CCHE and gradual build-up of trust have helped CCHE progress in the past six years. The existence of a Data Advisory Group formed at the outset also helped this process. Institutions have come to realize that they have much to gain by cooperating with the state agency since CCHE has kept its promise of relieving them of much of the IPEDS reporting burden; more recently, the data sets have been made more readily available to them as research data bases. The fact that private institutions have decided to enter the system on their own accord is cited as evidence of the fact that institutions value the statewide data system.

Success in the second phase — the Cohort Tracking System — can be judged not by increased data, but by improved ability to manipulate existing data to answer more complex questions. Benefits of this system include:

- Only three extract files for student tracking are defined and source data from SURDS can be entered into these files through multiple selection criteria. That is, the system is conceptually simple, with great flexibility in actual use.
- The system allows for multiple enrollment points, and it is entry- and exit-point oriented. That is, students entering in a particular cohort can be tracked forward in time, or students graduating in a particular year can be traced back in time to year of entry. This was noted as a special feature of the Colorado tracking system.
- The Local Area Network design and interactive software produce a fast and user-friendly system; this minimizes one of the drawbacks of SURDS which was originally tied to a mainframe computer.

Overall, development of a student data system and student tracking capabilities for the state of Colorado have been characterized by gradual, steady progress over the past six years. The system is driven primarily by sound planning, not by crisis responses. Also, because of this planning, relatively few and minor changes have had to be made in the system since its inception. This continuity is a definite strong point of the system, producing familiarity with and consistency of data elements and analyses.

Future Plans and Applications

In its initial applications, the analytic focus of the Cohort Tracking System has been on retention and transfer of students and not on actual graduation rates. As more years of data become available, comparative analysis of graduation rates will become more feasible. CCHE is progressing in the analysis of transfer data, but much work remains to be done. Staff have been experimenting with different displays and formats, and are anticipating looking at transfers in a new way as the data become available. Whether or not CCHE will report graduation rates for Colorado under the federal Student Right-to-Know Act of 1990, or whether institutions will do their own reporting, is yet to be determined.

The tracking system was originally designed to hold seven years of data which was considered to be long enough to track completion to graduation. However, initial data suggest that seven years is not long enough for some students — particularly minority students, who are more likely to be attending part-time — and the tracking system may have to be extended in two more years as the seventh year limit in the current system is reached. CCHE staff anticipate that computer hardware developments in the near future (related to information storage) may provide the capacity for this.

In sum, the technical capacity is in place for continued and expanded use of state data, and CCHE is poised to respond to new data needs as they arise in the future. As data become

available, CCHE will expand its Scorecard to include five additional items. CCHE also expects to be more involved with institutional use of state data in the future, a process that has already begun. Also, as mentioned above, the system will be extended to private institutions in the state. Finally, CCHE is considering options for feedback of data to high schools. This might take the form of sending data on GPA, enrollment, and graduation to high schools of origin.

The Florida State Board Data Systems

To understand the current student tracking capabilities in Florida, one must study the development of two separate data systems under the jurisdiction of two higher education boards in the state. First, the Board of Regents of the State University System, established in 1965, governs the nine public senior institutions in the state. Second, the State Board of Community Colleges, established nearly two decades later in 1983, oversees and coordinates the 28-individually governed public community colleges. As might be expected, the university system developed its data base capabilities first. What might be surprising is that despite its very recent establishment, the community college student data system has comprehensive and very advanced capabilities. In spite of the vast differences between the systems, they share certain features and are linked through a common electronic network.

Origins and Development

In the early 1970s, the Board of Regents of the State University System first recognized the need for better data at the state level. In order to monitor higher education policies in the state, the board needed solid information on student enrollment, degrees granted and other aspects of institutional operations. At this time, universities were immersed in data system development, and the board perceived a need to standardize definitions. A basic unit record system for all state

universities was put into place in 1976, and detailed student data have been collected each term since that time.

Over the years, a number of changes have been made to the system. Legislative actions (for example, new accountability legislation) have prompted many of the changes, and members of the academic community (regents, chancellors and university personnel) have originated others. New data elements have been added as needed, and editing procedures have been developed and modified.

In regard to student tracking, the system allows two distinct ways of determining graduation rates. First, data on degrees granted are part of the student data files. Second, a separate retention file was built to track new freshmen. Tracing back to the 1984 entering cohort, graduation rates can be determined through either the basic student data base or the retention data base.

Progress on the university data system has been made without the benefit of a large sum of money specifically dedicated to this purpose, and current operating revenues have been used. For a time, the Board of Regents had hoped to acquire an up-to-date data base management system, but the additional resources to purchase or develop a new system were not provided.

A very different developmental process occurred with the community college system. Initially, the State Board of Community Colleges collected aggregate reports from the institutions under its jurisdiction and there was no statewide data system. In 1987 the legislature appropriated $100,000 to the board to conduct studies on the development of a centralized student data base. A consultant was hired to study the computer systems that were in place in the public school system and the state university system; the plan was to come up with recommendations for a comparable and compatible data system for community colleges. The 28 community colleges were involved in planning from the outset, both through an MIS Advisory Task Force

and a Standing Student Data Base Committee. At the beginning, 120 potential data elements were presented to them; this number was pared down to 68. A two-phase process followed: in Phase I, (fall 1987 to fall 1988) only 28 data elements were collected by a limited set of colleges. In Phase II (fall 1988 to fall 1989), the full system of 68 data elements was pilot tested.

The complete Student Data Base System was put into place for the 1989-90 school year with all institutions participating. From the beginning, longitudinal tracking of students was planned and completion data were included in the data collection process. To date, two academic years of data are included in the community college data base, and the tracking capabilities of the system are now being tested. New entering students in fall 1989 have been tracked through fall 1990.

Current Capabilities and Uses

Student data from all public two-year and four-year colleges in the state are collected at the state level, with data from state universities available since 1976 and data from community colleges available since 1989. Longitudinal tracking may be done beginning with the 1984 entering cohort at universities and from 1989 at two-year colleges. These data systems are both linked through the Florida Information Resource Network, an electronic network that ties together these two data systems along with the public school data system (K-12) in the state. Each system works differently, however, and they need to be described separately.

The university system data base is called the Student Data Course File because it contains records of all courses for which each student enrolled as well as demographic information. About 150,000 records are added each term, and there are separate files kept of both end-of-term records and preliminary records (the latter being used for timely enrollment reporting). A retention data base is updated each term and kept separate as well. All of the files are "flat files" and are not integrated into a data base management system. In addition to the Student Data

Course File (which also includes degrees granted information), there is an admissions file that includes every applicant for the year, and a student financial aid file which is updated once a year.

Institutions submit data to one of the three regional administrative data centers. Records are edited both at the institution and at the home center. When records pass all edits, they are electronically transferred to the state office, the Florida State Department of Education. Further editing is done at the state level. All analysis is done in batch processing (mostly overnight), and the system has no interactive capability. However, the system does do what it was designed to do, and furthermore, is not as expensive to operate as is the community college data base.

Like the university system, the community college system collects both preliminary and end-of-term files. In the community college data base, however, these files are not kept separate; the preliminary data are overlaid with the final data. There are about seven million records in the data base, representing almost one million students. There are seven different record types:

- demographic
- entry level test information (for first-time students only)
- acceleration information (such as state examination results)
- program of study
- completions
- course information (one record for each course)
- financial aid information

At a minimum, each student has a demographic record and a course or completion record for each term; as necessary, additional records are added each term, and there is considerable variability among students as to the number of records residing in the data base. Similar to the

university system, files are automatically loaded once edit tests have been passed. Within 24 hours of submission of data, institutions receive two kinds of reports: verification reports which check against possible errors by comparing current data against last year's data, and standard reports such as an opening fall enrollment report.

Analysts have access to the data in the State Board of Community Colleges relational data base system in three ways: (1) through the Query Management Facility, for quick inquiry into the data; (2) through SAS, for standard reports; and (3) through IBM's DB2, for interactive access. Although DB2 allows fast access to the data, it is about ten times as expensive as batch processing. Currently, SAS extract files are being created from DB2 to reduce costs. The system works very well now but there is a need to bring costs down.

As part of the Florida Information Resource Network, the community college and university systems share several common capabilities. Both accept information electronically after edit checks are passed. Both produce standard reports every time a new file is accepted. Institutions have complete access to the data electronically through an Institutional Data Administrator at each college.

Statewide student data from four-year institutions have been available for many years through the State University System, and use of this data has expanded over the years. Regular output includes enrollment and degrees-granted reports for IPEDS and for the state of Florida, an annual fact book, and fee waiver information for the legislature. These data are also used for financial purposes since state support and student costs are on a credit hour basis. Graduate student stipends have been analyzed and this has led to an increase in funding. Four-year college data have been used by the community college system for follow-up of their students. In any given year, an estimated 400 non-standard analyses are done by a staff of computer programmers and analysts. Higher education faculty also use the state data bases in their research.

The community college data system also produces enrollment and completion data for IPEDS and for the state of Florida, and does many kinds of *ad hoc* reports for the legislature. One innovative area of inquiry is placement and follow-up studies of community college students. Once a year, student data are matched against data from the Department of Labor and Employment Security, licensing departments, the Department of Defense (for military involvement), the state university system, the U.S. Post Office, and even data from neighboring states in order to track students into those areas. Given the current interest in outcomes of higher education, the capacity to do this type of study positions the State Board of Community Colleges in Florida well ahead of most other state systems.

Another innovative effort took place in collaboration with the public school system. Analysts attempting to find out what happened to high school dropouts were able to use the community college data to identify students enrolled in community college programs. (They also found that 16% of high school "dropouts" had simply moved to another school district.)

A third area of collaboration is with American College Testing and The College Board. A contract was recently signed with these entrance testing organizations for the electronic transfer of test scores of every student in Florida and every student who indicated interest in a Florida institution. Also, there has been some electronic transmission of student transcript data through the system.

Overall Assessment

Those responsible for both data systems in Florida are well aware that advanced technology and system design provide only part of what it takes to have a effective statewide student data system. The system output is only as good as the quality of data entered into it, both in terms of consistency of data definitions across colleges and in terms of accuracy of the data itself. Staff at the state and institutional levels are working continually to maintain good

quality data in the system. One of the strengths of the Florida system is the quality of the data, and this is attributable in part to ongoing attention paid to common definitions, extensive editing at multiple levels, an annual audit of the data, and the incentives schools have to report the data accurately. A second strength of the system lies in the richness of the data base. Third, the basic unit-record design allows flexibility of analysis at the state level, plus the ability to track students longitudinally.

As the various pieces of the system have been put into place, institutional reporting burdens have decreased, and institutional access to quality, comparative data has increased. Given the involvement of participants in ongoing planning, and given the fast turnaround in reports going back to them, colleges have come to believe the system is their system. This is particularly significant for the Board of Community Colleges, which as a coordinating board of autonomous colleges can only encourage individual colleges to participate.

In comparing the experiences of the community college and state university systems, it is apparent that money is a critical asset in the development of advanced computer capabilities. The start-up costs of an interactive, state-of-the-art, relational data base management system are considerable, and operating costs are high as well. Given the added flexibility and speed of this kind of system, the financial commitment may be justified, and there is a payback within a few years.

It should be noted that the Florida system is exceptional in terms of the inter-relatedness of the entire education data system, the complexity of data bases, and the electronic transfer of data. There is collaboration among the three units in the system — the public schools, community colleges, and universities — and between them and varied private, state, and federal agencies. The potential for future cooperation is immense.

Future Plans and Applications

Clearly, the state of Florida has considerable potential in making creative use of the student data that it now routinely collects. As systems become more integrated and collaboration among agencies increases, the full potential of statewide data bases may be realized. If money were no object, the State University System would like a data base management system with interactive capabilities. But it is significant that the State Board of Community Colleges, which has such a system in place, must find a way to cut the costs of its operation.

In terms of specific issues for the near future, some changes in graduate rate tracking in the university system are expected. First, the system was originally designed to track first time college students only, but the legislature has recently passed new accountability legislation in which all students must be tracked. It is expected that programmers will utilize the existing data and build a retention data base for transfer students. Second, the legislature also recently passed legislation that would measure completion in intervals of terms, not years. The existing system will accommodate this change, but some programming must be done.

As more years of data become available, the community college system will do more extensive graduation tracking, focusing on time to complete degrees, completion rates, and retention rates, especially for minorities and college preparatory students. More research and management questions will be able to be addressed as the data base gains maturity.

In terms of the Student Right-to-know Act, the community college system will be reporting for its 28 institutions, but has not yet determined exactly how this will be done until additional information is provided by the federal government. The state university system is uncertain about whether it will report graduation rates for its institutions.

The Minnesota Data System for Public and Private Institutions

Origins and Development

The Minnesota Higher Education Coordinating Board (HECB) currently operates a relational data base management system using statewide data which permits tracking of students over time. This system is the outgrowth of two processes: the development of the Student Enrollment Record Data Base (SERDB) in 1983, and the decision to integrate files from this student data base into the relational data base in 1989. The development of the Minnesota system reflects a series of decision points and incremental improvements, each of which addressed new state needs that emerged during the last decade.

Until the early 1980s, HECB systematically collected enrollment data in aggregate form from all institutions in the state, and published these data in annual data reports. Several enrollment reports were requested of each institution which meant that the data collection process was quite cumbersome for institutional staff members and that data analysis by HECB was limited because the data could not be disaggregated.

In 1981, the staff of HECB made an internal policy decision to replace the existing arrangement with a student unit-record system to strengthen the analytic capabilities of the coordinating board, increase flexibility in production of annual enrollment reports, and reduce the reporting burden on institutions. Under the new system, the governing board offices of the three public systems — the University of Minnesota, the State University System, and the State Community College System — do initial collection and editing of the data from individual institutions, and then send data tapes to HECB which then further edits the data for internal consistency. Public and private vocational schools and private colleges in the state send data files directly on tape, diskette, or printed forms provided by HECB. The regular enrollment reports

are generated from unit record data collected annually for the Student Enrollment Record Data Base.

After the system was in use for a few years, it became evident to staff members at HECB that they had the potential to merge annual files to track students over time. Although the system had been designed only to collect and report on discrete data sets, the presence of a common student identifier (social security number) appeared to make linkage possible. Also, there were two other unit-record data sets which might also be linked into the system: financial aid files and post-high school planning program files built from surveys of high school juniors, containing data on personal characteristics, background and postsecondary plans. No action was taken until 1987-88, when discussion of some uses for tracking capabilities emerged once again. In 1988-89, HECB made a firm staff commitment to push for the development of a relational data base to link existing student files. With some assistance from an outside consultant, a three-pronged effort was made to explore expansion of the agency's data resources:

1. To assess the existing system, an audit was made of the existing student unit-record data base to determine the extent of unreported or inconsistent data, and a review was made of other existing data sets, such as financial aid program data.
2. Data needs were identified for tracking completions or degrees conferred. Staff members identified additions and deletions and modifications in basic student data that would be necessary.
3. An examination was made of means to link or integrate data from various files — existing or anticipated — for longitudinal analysis of students and enrollment patterns.

A design was developed for an integrated, state-level student research data base that focused on logical relationships among data elements within and across data sets. In 1989, a

relational data base management system was acquired to facilitate longitudinal analysis of student attendance, academic progress and transfer, and to permit integration of data from various data sets. All fall data from 1983 through 1990 have since been integrated into the system, and analysis of persistence over several years has begun. HECB is in the process of creating a unit-record degrees-conferred data base and hopes to start entering data in the fall.

Also, a permanent Data Advisory Committee comprised of representatives from HECB and the postsecondary systems was established to advise staff on data issues. Currently HECB is wrestling with definitions of students in technical colleges, and with multiple meanings of the term "extension student." They are looking at definitions of transfer students and new entering students as well, in terms of minimum number of hours needed to move the student from the status of new entering student to transfer student. There are also definitional issues related to private institutions in the state.

HECB has taken the pragmatic approach of doing what they can with available resources, and feel they are well on their way to achieving goals. Because staff members have commitments to many projects other than development of the data base system, delays have been inevitable. In addition, a number of new issues arose in the review and development process, and a major overhaul of the system may be undertaken in the next several years.

Current System Capabilities and Uses

Approximately 160 institutions — public and private, collegiate and vocational — are currently part of SERDB. Four-year institutions, community colleges, and private professional schools report enrollment data as of the tenth day of fall term. Vocational schools, public and private, report data covering a three-month period from July to October. (Reporting from private vocational schools has been somewhat intermittent.) Data from about 250,000 enrollment records are added each fall and there are currently over two million unique records in the system.

Individual records consist of 22 data elements including personal and demographic information furnished by the student and enrollment information furnished by the reporting institution. All data are entered into the system, reviewed and edited, and reported to the source for correction and revision.

All fall data from SERDB from 1983 through 1990 are integrated into the relational data base management system. During the actual matching process, student social security number, name, and date of birth are used to link records from different terms. A single record for an individual is then created with a unique number assigned to each student in the relational data base system. During this process, great care is taken so that this unique identifier is not assigned to the records of different individuals. (This is emphasized even more than making sure that every record of the same individual is assigned the unique identifier.) In the planning process in 1988-89, it was determined that financial aid data could not be integrated into this system because of basic data incompatibilities (e.g., enrollment data are reported as of the tenth day of the term, but financial aid data are collected at the end of the term).

Student persistence studies have begun through this data base system. For example, in response to a statewide planning project, HECB has looked at persistence of minorities, of older versus younger students, of full-time versus part-time students, by institution, and by system. Tracking can be done by both point of entry and point of exit. Efficient use of computing resources requires extraction of data into smaller SPSS files. All work is done in batch and the relational data base cannot be used interactively. To include new variables of interest, new SPSS files would have to be created.

For many years, the state has produced two annual publications: the Basic Data Series and enrollment data by racial/ethnic group. The current student data system supports production

of these reports in an efficient manner. The system also lends itself to special projects, and it is expected that this will be the greatest advantage of the new integrated data base system.

The Coordinating Board also produces special reports for the four governing boards in the state but does not share data files with them or with institutions. For example, it recently completed a special project for the community college board in which students who had attended community colleges and later transferred to four-year institutions were studied retrospectively.

Two years ago, the state legislature passed a law requiring HECB to turn over student data tapes to the legislature for the use of legislative research staffs. Although confidentiality issues have been addressed through removal of student identification, other concerns remain. With this kind of transfer process, users may not be fully aware of the caveats of data usage, the limitations of the data, or concerns about mis-use of data in an overtly political arena.

Overall Assessment

The Minnesota data system's strength derives from the scope of institutions included in its system. Unlike other states, private collegiate institutions and proprietary institutions are involved, as well as public institutions. Its success and comprehensiveness, however, raise other issues, for example, the availability of enough staff and computing resources to use the system at its full potential.

Several definitional problems have also been encountered, particularly in defining the basic student categories, such as first time in college or transfer student. Currently, the state system depends on what the institution provides, and there is not as much consistency of definition as is desired. Although these issues are being addressed, explanations are provided along with data so that users are aware of the definitional variations affecting the quality of the data.

Future Plans and Applications

One immediate enhancement to the system will be the collection of data on degrees and other awards conferred beginning this fall 1991. These data will be collected annually from all public and private, collegiate and vocational schools.

There is discussion about a possible switch to end-of-term collection of student data, with some expressions of support from institutions. Also, data might be collected from each term rather than just from the fall. These changes might result in the integration of massive amounts of data that now are incompatible, which in turn would create greater demands for data processing.

The 1990 legislature directed HECB to coordinate the development of a consumer information system for occupational programs, particularly program placement information. After considerable review by an advisory committee, the decision was made to "de-couple" the placement system from the statewide student data files containing completion records in order to avoid the conceptual and practical problems that would occur if they were combined into the same system.

The statewide follow-up reporting system for occupational and technical schools will be based on aggregate data supplied by institutions based on mail and telephone surveys of completers. It was recommended that HECB:

- facilitate the use of the system through development of appropriate reporting procedures;
- assemble, interpret, and publish annually the information that will be provided to consumers; and
- develop an audit system for monitoring and promoting compliance with standards.

This development is significant in part since the legislature may soon request similar follow-up data from graduates of two- and four-year institutions. The HECB will probably continue to maintain a separate system of data for this purpose.

The New Jersey SURE System

Origins and Development

The development of the Student Unit-Record Enrollment system (SURE) in New Jersey was initiated by the research office of the Department of Higher Education. Through the early 1980s, this office collected state and federal data centrally in the form of aggregate reports. With the onset of IPEDS and with a growing interest in more detailed analyses of students and student progress in college, this office made the decision to develop a comprehensive unit-record system to collect information on all students in the state, from public and private two- and four-year schools. From the outset, the purposes of the system were ambitious: to compile the data for IPEDS reports and into a series of state-level IPEDS-like reports that had previously been based on aggregate data; to develop a tracking system for following selected cohorts of students across institutions in the state; and to incorporate other data sources such as financial aid data and follow-up data from the state's mandatory basic skills testing program. Progress has been considerable in the past several years, but a number of difficulties have arisen along the way which have forced the department to scale down its objectives, and to postpone some areas of development.

Initial planning and development took place in 1984-85 and the system was to begin collecting pilot data in 1985. A gradual phase-in of institutions was planned, beginning with the four-year colleges in 1985, followed by community colleges, public universities and private institutions. By 1989 or 1990 all colleges in New Jersey were planned to be in the system.

During the early years, institutions were involved in the planning process. A working group of representatives from public schools met in two separate sessions, one for community colleges and one for four-year colleges and universities. However, despite the inclusion of all schools, much of the groundwork was laid through discussions with representatives from the four-year state colleges in the state. When the time came for community colleges to be involved, many decisions had already been made that were not compatible with community college needs. As a result, some modifications had to be made in the system, and in other cases decisions were made to force the community college data into the system already in place. The working group met for the last time in 1989. The structure still exists for continuing these meetings; however, in a context of scarce resources, the committee simply stopped meeting once its major work was completed.

The first pilot data was collected from the nine four-year colleges in the state in 1985. Community college data began to be collected in 1986, and university data began to be collected in 1987. By fall 1990, all public institutions in the state were submitting data to the system. Primarily because of resource limitations, however, the original plan to include private institutions in SURE by 1989 or 1990 has been postponed indefinitely.

The original plan was to develop a system for following selected cohorts — entering freshmen and new transfer students — for an appropriate number of years. This part of the plan has been implemented and is the data source for persistence studies and the major non-IPEDS usage of SURE data. In the last three years it has become clear that a general longitudinal tracking system tracing all students is needed. Thus, the objectives of this component have been expanded over time to include more students, and enhancements are now in the planning stages.

Objectives have been scaled back in the area of follow-up to basic skills tests. Since these tests are required of all students in the state, it was thought that the SURE system could help

provide useful follow-up information on remediation, grades and persistence. Following some initial attempts, however, it was determined that institutions have too many ways to collect and organize this information, and that it was not feasible to standardize these data across the state. The state office that deals with basic skills testing continues to collect follow-up data in aggregate form from institutions.

Another area where data collection was begun, but was thought to be too spotty to be useful, is in the area of financial aid data. Again, the financial aid system that collects extensive documentation on loans and grants will continue to collect this information separately. Research staff believe it is possible in a technical sense to link financial aid data to SURE; however, the need has never arisen and this has not yet been attempted.

Many problems have been encountered in data quality, both across schools and in the same school from year to year. Staff turnover in many colleges is high, and schools change computer systems. These and other factors beyond state control affect the data provided. From the state perspective, just when one set of problems was ironed out, another developed.

In sum, the original planning for this system required more work from schools than was feasible. As a result, two limitations have been accepted: one on the extent of data collected in SURE, and a limitation on the extent to which centralized computerized reporting can replace institutional reports. However, the system has been put into place despite the many obstacles, and it is meeting basic objectives. In some areas, it is not as comprehensive as envisioned earlier, while in others — especially in student tracking — it is becoming a more comprehensive system than was originally foreseen.

Current System Capabilities and Uses

There are 31 separate governing boards in the state of New Jersey, representing three universities, nine four-year state colleges and 19 community colleges. Since 1990 all of them

participate in the SURE system. (Some institutions have been submitting data since as early as 1985.) There are two annual inputs to the system: a fall enrollment file, or snapshot of enrollment on the tenth day of the term, and a degrees-conferred file, representing degrees conferred over the fiscal year. Over 250,000 enrollment records are submitted each fall, containing 35 data elements including the following:

- identifiers (social security number, institution)
- attendance status (full- or part-time)
- class level
- registration status (entered as first time in college or transfer)
- biographical (sex, racial/ethnic, date of birth, state of origin)
- academic (total credits enrolled, cumulative credits, GPA)
- high school (graduation year, rank, SAT)
- transfer information
- educational opportunity fund participant (minority scholarship program)
- basic skills scores (scores from 7 tests)

There are about 30,000 degrees-conferred records submitted annually, each containing identifiers (social security number, institution), biographical information, and degree(s) granted and major(s). When the data are submitted, edit reports are returned to schools to show problems or need for corrections. When the data are clean, a large set of tabulations is sent to each school. All work is done in batch mode.

In terms of tracking students, the research office essentially defines 33 freshman files and 33 transfer files each year. (These correspond to the 31 schools, with Rutgers University having three campuses that are tracked separately.) Merge procedures are used through SAS and

students are matched from different fall terms. This system is fully operational at the present time, but the number of years of accumulated data is limited. Degree-completion data are being merged with enrollment data on a regular basis. As time passes and more years of data are accumulated in the system, complete data will be available for greater numbers of students. It is expected that in the near future enough years of data will be stored so that larger numbers of community college students will be able to be tracked from entry to completion.

There is no relational data base structure and interactive capacity is limited. Extract files are downloaded for analysis on an *ad hoc* basis using PC SAS. There is no routine for downloading data and transferring it into personal computer applications such as graphics packages and spreadsheets. Despite the existence of the SURE system and the extent of the data collected, data reporting in New Jersey remains decentralized.

The most important output of the SURE system at present are the IPEDS reports, and a series of state IPEDS-like surveys that are more extensive in nature. An interesting point is that SURE processes the student unit records and produces aggregate school-level data. This is maintained in a separate aggregate information data base and is used to generate a variety of reports. Because the private institutions submit aggregate reports to the research office, these can be entered into the same aggregate data base, and complete state statistics are produced.

The state research office sends comprehensive tables to each institution and occasionally does special tabulations for them at their request. From time to time, extract files are produced for *ad hoc* analyses. A public use tape with no student-identifying information is also produced, and this is requested to a limited extent each year (about one or two requests per year).

SURE cohort files have been used for fairly elaborate persistence analysis, despite the fact that only limited data exist to date. The College Outcomes Evaluation Program in the state has used SURE tracking data for about three years to estimate persistence rates of students.

Data are used frequently in internal documents and reports and information (often in the form of tabulations with footnotes) is released to the public, usually in response to specific questions. The state legislature tends to use the standard reports to answer most questions, and only occasionally requests special analyses by the research office. In addition, SURE data are used in preparing parts of regular Department of Higher Education reports, including the Biennial Report on Higher Education in New Jersey; A Report on Access, Retention, Transfer, and Graduation at New Jersey's Public Colleges and Universities; strategic plans; fact books; and an annual collection of tables, used as background and briefing material for the budget process.

Overall Assessment

The conceptual and analytical power of the New Jersey Student Unit-Record Enrollment system resides in the basic unit-record concept which collects information on individual students in all public (and, potentially, private) institutions, and which permits tracking students over time in relation to a rich analytic data base. However, in practice, one weakness of the system stems from structural and political factors which are external to the system itself. There are 31 fairly autonomous governing boards in the state, and the Department of Higher Education cannot simply command cooperation. While institutions are required to report to the department, how much effort they have to make and how good the data are can not be controlled. Furthermore, in New Jersey, student enrollment is not directly linked to institutional funding, and budgets essentially come from the state legislature. Thus, there are not sufficient incentives to ensure completely reliable institutional reporting. It appears, at least, that it is harder to secure cooperation when enrollment data are not directly related to funding. In New Jersey the level of cooperation with schools was not as high as would have been required to meet the original goals of the system.

Finally, the centralized computer system used in New Jersey has had both advantages and disadvantages. Unlike many states which confronted the challenge of building a tracking system with a data processing shop and programming languages such as COBOL, the more research-oriented staff in New Jersey used SAS as a tool. In the first few years, the research staff designing and implementing the original system used only limited features of SAS and invested in developments that have had to be redeveloped to use SAS more efficiently. One of the challenges faced was how to build an integrated, automated system from what was originally conceived as a collection of data files and programs. With gradual improvements, SAS has, in fact, become a good choice for future developments. In sum, although New Jersey was put at a relative disadvantage in early years, the process has evolved to the point where progress is substantial, and the system is working more efficiently.

Future Plans and Applications

Various parts of the SURE student data system are being increasingly automated. A longitudinal file and longitudinal tracking system are being developed that would routinely follow all students and produce graduation and retention statistics. There is still a plan to include private institutions, but no definite timetable. If additional resources were available, a data base management system would be developed, and the entire process would be automated from receiving files through final reports.

It is presently uncertain whether SURE will be involved in federal reporting under the Student Right-to-Know Act. There is some thinking that institutions might want to do their own reporting so that sufficient explanatory information might be incorporated in the federal report.

Evolution of the State Data System in North Carolina

Origins and Development

Unlike many other states, efforts in student tracking in North Carolina preceded the development of a unit-record system. The impetus for student tracking came from an external source, from the Office of Civil Rights (OCR). Stemming from civil rights litigation in the early 1970s, OCR required that retention rates and graduation rates for black and white students be reported. A series of negotiations followed between the University of North Carolina and OCR, and in 1977 an agreement was reached. Since the state did not have a unit-record system in place, tracking reports had to be prepared by individual campuses.

Although this agreement addressed the civil rights requirements, the state itself had a need for better data. The University of North Carolina System, which encompasses all public four-year institutions in the state, collected various reports from its institutions, but could not handle the volume of requests it received for student data. Also, it took until spring of each year to resolve discrepancies in the data. With fairly clear ideas about what data were needed, a system-wide student unit-record system was designed and was pilot tested in 1980-81. The state converted to this data system in full in 1981-82, receiving tapes from all public universities. Although the Board of Governors of the University of North Carolina does not have authority over two-year institutions, it does receive a unit-record tape from the State Board of Community Colleges. Thus, all public institutions are contained in the data base.

When the system was first proposed, it was not warmly received by several of the university campuses, who were concerned that a centralized system represented a transfer of power to central administration and that compliance would be costly. Despite these considerations, all institutions were required to submit tapes under the authority of the Board of Governors. Members of the governing board, on their part, were conscious of opposition from

the start and chose not to be overly ambitious in data collection efforts; they collected only what data were needed for external reporting and would not collect more than they could edit. This restricted data collection effort allayed some concerns at the outset. Over the years, opposition to centralized data collection has been further diminished, and the workload of individual institutions has been reduced as state efforts have advanced. At the current time, there is reasonable support of state level data efforts.

Designed from the start to meet basic data needs, the North Carolina system has undergone relatively few changes over time. Mostly IPEDS definitions were adopted at the outset and these have been used consistently across institutions. The three major files in the system have existed since the beginning. The biggest change is the dramatic increase in the number of uses of the system.

Current System Capabilities and Uses

The University of North Carolina student unit-record system collects data from all 16 four-year institutions in the state. There are over one million records in the system, and approximately 145,000 enrolled student records are added each year. (Enrollment data are collected for fall term only.) In addition to the enrolled student file, there is an applicant file and a degrees-conferred file. About 80,000 to 100,000 records are added to the applicant file each fall, and about 30,000 records are added to the graduate file annually (collected as of July 15). The three basic files are linked through a common identifier (social security number) and all files contain data going back to 1981-82.

In addition to the basic files, the system is supplemented by other files that are linked by social security number. These include students taking remedial courses, nursing students who have transferred in from community colleges, and teacher education students. Although annual financial aid data are not part of the unit-record system, there is some survey data that addresses

financial aid issues; every four years, a large follow-up survey of college graduates is conducted, and financial aid data are included in this. Other data include a survey of incoming freshmen to be conducted in 1991. This survey will include data on income, education of parents, and student financial aid, and will result in a subfile on freshmen; it may or may not be continued annually in the future.

A history file is also being built to store pieces of information for every student who entered as a freshman or transfer. This file is intended to assist in building better predictive equations for admissions decisions, and to identify factors related to student progression.

As a unit-record system, the North Carolina system is performing exactly what it was designed to: provide the data for numerous enrollment and other reports. However, as a tracking system it is not yet being fully utilized. Aggregate institutional reports still serve as the primary data source for published retention and graduation studies. There are parallel tracking efforts in the state and results from the state-level system are checked against institutional reports. Increasingly, the two sources reconcile fairly closely. Several reasons are cited for not using the statewide tracking system more fully for reporting graduation rates. First, the state unit-record system currently has no procedure for dealing with mis-reporting of social security numbers or for making changes in them from year-to-year. The campuses do make such alterations when they are known, and the result is that individual campuses track students better, and their retention measures are a little higher. Second, for four-year graduation rates, the state system ends with June 30 graduation data. Campus rates are more inclusive because they include the second summer session. Once again, campus graduation rates are a little higher. Because of these limitations, the state tracking system is not being fully realized, while the institutional reporting burden continues unchanged.

In terms of computer environments, there are two distinct strategies operating at the state level, one employed by the programmers and one used by the institutional researchers. A group of six full-time programmers who work on IBM compatibles use SAS, COBOL, and PL1 to access the data stored on a mainframe computer. (PL1 is an old language, but is still used for working with large arrays of data.) The institutional research group works on Macintosh computers with files downloaded from the mainframe, using Excel and graphics packages.

The unit-record system has hundreds of applications. An estimated 40% are routine reports and 60% are special requests. The data are used internally for the production of ad hoc reports and in the annual production of the North Carolina Higher Education Data (NCHED) reports, a statistical abstract of higher education in the state, a long-range planning document and various newsletters. In addition, the data are used by graduate students, faculty, and other educational researchers, and for meeting requests for information from outside agents.

In the past several years, applications of the system have been very diverse. For example, the system has been used to forecast enrollment by documenting changes in the yield rate over 10 years. (There was a decline in yield rate due to more applications per applicant.) Second, data on applicants, acceptances, and enrollments of black and white students have helped in monitoring affirmative action efforts. Third, a study of retention among students in three engineering programs was conducted, as was a similar study of nursing students. These studies informed academic leaders in the state about their students and programs. Finally, routine tracking is done on students by race, sex, year of entry and test scores.

There has been significant expansion over the past 10 years in usage of the data in response to the needs of several groups. The legislature is much more interested in student data than it was when the system was begun in 1981. Campuses have also been requesting data much more often in recent years, and there is growing interest in making comparisons to peer

institutions and in using the state office as a data exchange. (Tapes sent to institutions generally have the student identification removed. However, exceptions are made so that student identification may be included for purposes of educational research for curricular improvement.)

Overall Assessment

One of the strengths of the North Carolina student-unit record system is the consistency of data over time. Planners had a good idea of what they wanted from the system, and the core set of data elements has remained essentially the same over 10 years. All the basic files were designed at the outset and there have been few changes in file structure over time. The system exemplifies a stable longitudinal data base. Given the basic unit-record design, the system also allows flexibility in reporting student characteristics plus the ability to do peer institutional comparisons across the state.

One of the weaknesses of the system relates to the complexity and size of the data files. To answer even the simplest questions, analysts must work through huge data files. Also, the system is not a relational data base system and this adds to the cumbersome quality of much of the analysis.

In conclusion, the unified governance structure of higher education in North Carolina under a single Board of Governors sets it apart from many states and facilitates the sharing of data across institutions. In addition, the particular origins of student tracking in North Carolina seem to have shaped the data system for well over a decade, and only now are significant changes being expected for the future. With the Office of Civil Rights agreement in 1977, and with a system in place of aggregate reporting of retention and graduation rates by individual colleges, the state unit-record system has not yet been called upon to realize its full potential. With further impetus from yet another federal source, the Student Right-to-Know Act, this system may be more fully utilized in the future.

Future Plans and Applications

Although student tracking capabilities at the state level have been underutilized until now, the Student Right-to-Know Act may serve as impetus to the state-level reporting of student retention and graduation rates. To solve the state-level problem of social security number changes, it is expected that in the near future institutions will send annual updates of changed numbers to the state so that tracking can be done at the state level. This will reduce the need to check the results of one system against the results of the other.

Another possibility is that the state will collect a student unit-record for terms other than fall. Although this has been discussed and delayed for a number of years, interest in the idea is growing. Again, this would enhance state capabilities to track students. Current limitations are due more to historical precedent than to actual weaknesses in the computer system, and changes in operating procedures may greatly expand the use of the state-level tracking system.

Student Tracking in Tennessee

Origins and Development

The student tracking system in Tennessee traces its origins to the creation of the Tennessee Higher Education Commission in 1967. Created to achieve coordination and unity in higher education, statutory duties of the commission included: development of a master plan for public higher education in the state; development of funding formulae; making recommendations for specific programs and departments; and review of proposals for new degrees, departments, and divisions. To implement the formula approach to funding, commission staff saw the need for accurate student enrollment information. To fulfill mandates related to program approval and review required systematic information on program offerings on each campus in the state.

In the late 1960s, commission staff worked with institutional and governing board staff to develop two automated information systems, the Student Information System (SIS) and the Academic Inventory. This collaboration enabled all parties concerned to participate in the system design phase and in the development of common definitions. By 1970, both automated systems were implemented.

The Tennessee Student Information System was one of the earliest statewide student data systems developed in this country that contained unit records on each student identified by social security number. Confidentiality issues arose in the development process, with concerns expressed about the use of student social security numbers in a centralized data base. This issue was resolved by the commission's decision to report aggregate student information only.

The Academic Inventory also pioneered new ground, developed at a time when no centralized system existed to identify program offerings, either at the campus or governing board level. Consisting of an inventory of degree programs by major field and an annual report of graduates by social security number, this system made retention and progression studies possible.

In 1984, the Tennessee General Assembly enacted a reform act which set forth specific goals for educational reform and required annual progress reports. One goal called for "an increase in the percentage of students who enter four-year university degree programs and who subsequently earn baccalaureate degrees." In response, commission staff developed the Graduation Rate Study System, based on data that had been collected since 1970 and that permitted retrospective analysis. Beginning in 1984 (and tracing back six years), commission staff have completed graduation rate studies for first-time freshmen entering college since 1978.

Both the Student Information System and the Academic Inventory were originally written in COBOL and maintained by the state's centralized computing center. However, routine maintenance to implement legislative and policy changes over a fifteen-year period made program

changes difficult and costly to update. Commission staff rewrote the Student Information System programs using SAS software in 1986. This change greatly enhanced staff ability to update the system, both from a time and cost perspective, and enabled staff to write specialized programs to answer *ad hoc* questions. The Academic Inventory has also been converted to a SAS-generated system in recent years.

Current System Capabilities and Uses

The Student Information System collects student data from all public higher education institutions in Tennessee, consisting of nine universities, 12 community colleges, two technical institutes and two special purpose institutions. Approximately 185,000 records are processed each fall. SIS consists of a unit record on each student attending one of these institutions as of a census date (the fourteenth calendar day from the beginning of classes) for fall, spring and summer terms; there are also three supplemental reports (fall, spring and summer) which include classes not in progress as of the census date, short course enrollments, and students enrolled exclusively in continuing education units.

Included in the data base are social security number, demographic data (sex, race, age, permanent address and citizenship), first-time and returning student status, transfer information, student level, type of credits, number of credit hours earned and major field. Adding educational assessment information to the student record (for example, ACT/SAT scores) was considered but not implemented in the mid-1980s; as a result, these data are collected by the commission on an aggregated basis only. Approximately 38 independent colleges and universities provide aggregate enrollment data to the commission for analytical purposes.

The Academic Inventory maintains information on all academic programs offered by Tennessee public and independent postsecondary institutions. The system produces an annual

report of graduates of all academic programs from the public sector, including age, sex, race, type of degree and major field.

The Graduation Rate Study System uses the Student Information System to identify an initial pool of first-time, full-time freshmen. These students are tracked through public institutions and are matched with six successive years of graduation records, using social security number as the matching key. Reports are generated for graduation rates by total population, type of institution and race, differentiating between graduates from the admitting institution (freshmen) and graduates from another institution (transfers).

Enrollment data from the Student Information System are used to support the funding formula system in the state, to provide demographic and trend information to public policy makers, and to meet specific information needs as they arise. For example, enrollment data are analyzed by race to respond to court-ordered desegregation goals; teacher education enrollment data are used to examine the minority teacher shortage in the state. The commission publishes statewide enrollment and graduate analyses annually in a Statistical Abstract.

The Academic Inventory system is used for a variety of purposes, including program review, performance funding, master planning, and to support the commission's role in supplying public information on Tennessee higher education. This system serves well the purpose for which it was intended and generates valuable program and graduate information for decision makers.

The Graduation Rate Study has been used since 1984 for responding to legislative mandates. Retroactive studies utilizing data from the two automated data systems have provided detailed graduation rates for many years. Also using these data systems, a Two-Year Transfer Study is conducted which determines how many students entering a two-year institution progress on to a four-year school. Prepared for a Desegregation Monitoring Committee, an Enrollment

Progression Study has been completed which shows student progression from year to year by race.

Collaboration with other state agencies is ongoing. For example, the Tennessee Student Assistance Corporation, which collects data on student financial aid, has requested data from the Student Information System and has matched the two sources through student identification numbers. Also, data have been shared with the Department of Education in an attempt to study teacher education issues in Tennessee. Finally, both public and private institutions have contacted the commission for comparison data, and tables are supplied at their request. To date, computer files have not been shared.

Overall Assessment

The Tennessee student data system has many strengths, beginning with the unit-record system approach which provides analytic flexibility at the state level. This system was well designed from the start, and very few changes have been necessary over time. Tennessee's data systems are noteworthy for their long history of reliable data production and for their stability of definitions and processes which make longitudinal studies possible. Overall, these systems provide strong support for the funding process, desegregation efforts, legislative benchmarks, and policy decisions on on-going educational issues. Serving as a national pioneer, the Tennessee Student Information System has been used as a model for several states in developing statewide unit-record based systems.

The governance system in the state and its formula funding work to the advantage of the statewide data systems by providing schools with a motive to submit correct and complete data. Thus, the cooperation of institutions is enhanced and accuracy of the data is increased.

Technical limitations have been reduced by the system's conversion from COBOL to SAS; this has increased flexibility, improved speed of processing, and reduced the costs of operation

of the system. Absence of interactive capability is one drawback of the system, but batch production mode seems adequate for updating student records and producing needed data. Lack of admissions and financial aid data as part of the student data system may be another weakness. Overall, however, Tennessee offers an example of a stable statewide student record system that has been producing reliable and comprehensive data for many years.

Future Plans and Applications

No major changes are anticipated for either the Student Information System or the Academic Inventory. Commission staff continue to look for ways to improve both these systems, and minor modifications may be made. Small changes, such as the addition of data fields, may be made in response to legislative decisions. Commission staff are interested in the addition of student assessment data to SIS, but have no definite plans for change at this time. Automation of aggregate data from independent colleges and universities also will be considered.

In regard to the Student Right-to-Know Act, if certain definitions are standardized at the national level, Tennessee definitions may require modification. Presently, the commission plans to report graduation rate data from the Graduation Rate System.

Student Data in the University of Wisconsin System

Origins and Development

The origins of the system-wide student data system in Wisconsin can be traced to 1971 legislation which merged two boards of regents into the University of Wisconsin System, and which charged the newly-formed System Administration with coordination and public accountability. Staff members in the System Administration firmly believed that a system-wide computer system was necessary, and that planning questions could be better addressed by having student data files available at the System Administration level. In the fall of 1973, the University

of Wisconsin System began a data collection process called the Central Data Request (CDR). This name derived from the fact that a single file or "central data request" was made from each institution each fall and spring term; no longer were numerous paper reports required. (Collection of summer term data began in 1980.) The CDR was the common language jointly agreed upon by the institutions and System Administration, and it defined the data elements to be collected about students in the UW System.

The need for common formats and definitions was addressed from the outset, and there was extensive documentation in data element dictionaries and code books. As data came into the system, descriptive information was produced and published. Early on, however, questions were raised about the limitations of cross-sectional data, and an interest in longitudinal analysis developed. (Some institutions were doing longitudinal analysis at this time, but the System Administration had no such capabilities.) More basic computer needs were being addressed, and there were no resources available for such system enhancements. Basic computer development was proceeding rapidly, and both the CDR and a budgeting system were brought up within a year's time.

By the late 1970s, interest in graduation rates re-emerged, and various models were studied. One staff member carried major responsibility for the development of a tracking system over a period of 18 months. Involving individuals from several campuses and system-level computing people, various designs were tried, files built, and so on. A test was conducted in 1982 and basic tabulations were produced. The Student Flow Information System (SFIS) was put into place. It should be noted that at the time of its inception, the system was focused solely on graduation rates of new freshmen, and no attention was paid to year-by-year retention analysis or to other kinds of students.

Even at this point progress was tentative for a time since some institutions were concerned about possible negative implications of the data. Caution was exercised, and only summary data from the entire system was distributed across the state while individual campuses received their own graduation rate data. Later, as the data was used more and publicly acknowledged, the System Administration began to send all data to everyone. In 1991 graduation rates by institution were published for the first time in an Occasional Research Brief.

Over the years, SFIS has been expanded by the addition of new variables, and the CDR manual has been modified accordingly. Data consistency has been addressed in an ongoing way. In 1987, a thorough review of the system was conducted, and it moved into a production mode. Overall processing was sped up. A graduate flow model to correspond to the undergraduate flow model was developed, but this has yet to be implemented.

Recently staff members have been evaluating some of the logical choices made at the outset, such as the decision to track new freshmen only. Current interests are broader, with interest in the progress of transfer and special students on the one hand, and in year-to-year retention on the other. Additional programming is underway to allow for retention analysis in addition to graduation analysis, and to permit examination of various groups of students.

Current System Capabilities and Uses

Encompassing data since 1973, the University of Wisconsin Central Data Request system currently has approximately 5.2 million student records relating to about 800,000 individuals who have attended at least one semester since 1973. This includes students from all public four-year universities and from the state's 13 freshman-sophomore university centers. (Vocational/technical institutions are not included.) The CDR uses a unit-record approach to data collection and data are gathered each term. Student data elements include biographical/demographic items (sex, race/ethnicity, marital status, etc.), previous educational experience (high school data, transfer

data and test scores), and current educational activity and status (major, current hours enrolled, cumulative hours attempted and earned, GPA, etc.).

The Student Flow Information System is updated once a year with data from the semester CDR files, and information is generated on the collegiate progress of individual fall cohorts of new freshman students. Two basic forms of output are produced: standard tables, described as about "six to eight inches" of computer printout, covering all aspects of SFIS; and a series of analytic files, or computer files that are smaller and more accessible than the total SFIS.

To produce this output, the total SFIS file is sorted by social security number so that each student has a "stack" of data records corresponding to the number of semesters he/she attended college. Redundant data from the stacks are eliminated (such as personal data which appears one time for each semester), terms are added up, cumulative variables are built, degrees are recorded, certain cumulative variables are closed off when degrees are attained (such as time to degree attainment), and one record per person is created for every student who has ever attended. Even with all this data reduction, the resulting file is still very large. For example, there are 450,000 "new freshmen" in total since 1973. Not all students can be tracked successfully, and those with dummy social security numbers or other identification problems are excluded; however, it is estimated that about 92% of students are tracked regularly through SFIS.

The student outcome data are fairly detailed, with 13 different outcome statuses that are tracked (such as bachelor's degree from original institution, bachelor's degree if transferred, still enrolled in original institution, still enrolled but at a different institution). The system allows study of transfer between institutions and simple comparison of graduates versus drop-outs.

The system has been characterized as a "third generation system" — one which was built, then refined, and then expanded in its analytic capabilities. However, it cannot be characterized

as a relational data base structure. The whole system is run in SAS without interactive capability.

In addition to the student portion, CDR has a curricular portion that also contains instructor information. Financial aid records constitute a separate portion of the CDR and are collected at the end of each fiscal year. Data from the student data base can and have been merged with financial aid data. For example, a recent study was done of graduation rates of a particular group of scholarship recipients in which variables from the financial aid data base and CDR were merged.

The CDR data comprise the core data base of the information system, and data from this core can be combined with other types of data and aggregated in a variety of ways to build analytical data sets. CDR data are used extensively to support various policy initiatives in the UW System, and considerable detail is available through the following publications: the Student Statistics Book, a cross-sectional look at the fall term; the Minority Student Statistics Book; the Fact Book; the State Blue Book; and the Occasional Research Briefs, papers on such topics as outcomes of new freshmen. Other applications include the analysis of transfer students, time to degree, minority students, students who come from small high schools, and outcomes of students receiving certain kinds of financial aid. Data also are used for planning purposes by the University of Wisconsin System, the state legislature and the public.

Within the system, System Administration provides detailed reports to institutions. On occasion, tapes have been given to individual institutions, and the System Administration also has assisted campuses in doing specialized studies. System Administration is encouraging institutions to develop in-house analytical capacities and also is hoping to coordinate joint studies among institutions. Data from the CDR have also been supplied to high schools through an ACT study.

Overall Assessment

The Central Data Request system in Wisconsin is appropriately described as a mature data system, widely accepted as containing accurate and consistent data over time. The design itself has facilitated the addition of new variables, and as these data elements have been added over the years, they have been carefully defined. Moreover, data are edited very extensively each semester.

Based on this rich data source, the System Administration has developed considerable ability to track student graduation in a variety of ways. The richness of the source data is indeed one of the major strengths of the Student Flow Information System. The ability to track students across institutions in the state is another significant advantage. However, an obvious weakness of the system is its basic file structure which does not allow for retention analyses.

SFIS has been in place for so many years that unanticipated student tracking issues are arising, i.e., the issue of what to do with students who return to school ten years after dropping out. A number of states have already copied pieces of the Wisconsin system, and it can serve as a resource to other states as more information on the use of longitudinal data bases is sought.

Future Plans and Applications

The Office of Policy Analysis and Research intends to develop a new retention information management system that allows for greater flexibility in using the CDR. The new system will have different ways of storing and accessing data. Discussions about data base design are currently underway. Staff are looking at a relational data base structure and feel it would not be too difficult to adopt. The expectation is that initial parts of the new system could be brought up in a three- to four-month period. If a relational structure is used, then query language capabilities would be appropriate.

New files have been built. Some additional custom files will be devised and in the course of doing this, estimates may be made on the cost of various strategies for more extensive changes. It is expected that the UW system will come to a system-wide decision regarding the Student Right-to-Know Act, and required data will be run off of the central data base.

IV. Conclusions: Looking Back and Looking Ahead to State-Level Graduation-Rate Reporting

The Student Right-to-Know and Campus Security Act of 1990 will invigorate the reporting and analysis of college graduation rates and other indicators of campus conditions and educational performance. This invigoration will occur partly at the campus level where key statistics will be more readily available and — we can hope — discussed, compared and acted on. This will be a healthy development as long as single statistical measures are used, not as self-explanatory facts but as indicators of conditions that require thorough analysis, explication and appropriate actions. Invigoration will also occur at the state level as more and more states decide to become involved — as new statewide student data bases are developed and as existing statewide student data bases are adapted to fulfill student tracking functions. There is a risk, however, that the existing and in many cases more sophisticated state capacity to analyze and report student persistence, transfer, completion and other outcomes will, over time, be displaced by the framework of federal, institution-based reporting — much the same way that certain types of enrollment and financial reporting in higher education have tended to adapt to the uniform, simplified federal reporting in these areas. This could be a great loss. This risk can be minimized to the extent that state roles in this process are recognized and built upon as implementation of the federal law proceeds.

As this report documents, many state-level student data bases preceded this act, and the uses and potential of these data systems go well beyond the federal requirements. Several points deserve reiteration and elaboration:

- The development and operation of state-level or multi-institution-level student data systems encourage analysis and discussion of the underlying educational conditions and issues in ways that federal reporting do not. Faced with the task of analyzing and

providing information on student access, progress and success in postsecondary education, state agencies typically have worked with their institutions over a period of years to develop relatively comprehensive and flexible data systems that provide both key indicators for public information and rich data sets for research and policy use. The federal government should, at minimum, take advantage of state knowledge and expertise in these areas as implementation of Student Right-to-Know proceeds.

- As a specific instance of this, several states are already tracking student progress from multiple starting points, through multiple programs or institutions, to ending points that generally are not determined at the outset. Data bases that are linked across institutions at the state- or system-level provide the capability to examine and address these multiple paths across institutions much more effectively than single institution reporting. Given that Section 103 includes certain types of transfers among completion rates, federal reporting would almost by necessity force institutions to turn to states for some involvement in this matter.
- The traditional college-going cohort of first-time, full-time students is a diminishing proportion of entering students and total postsecondary enrollments. To define key indicators in terms of this non-representative population runs the risk of distorting the success of many institutions in fulfilling their missions and misleading the students and public who need to be better informed. Comprehensive state data systems can address these diverse conditions more effectively than can single statistics reported by single institutions. Again, the state role is significant.
- Similarly, many states have discovered that the fixed or limited tracking times originally established were not adequate to follow the non-traditional student that attends many public institutions. Some states have moved in the direction of

publishing persistence rates along with longer interval graduation rates to address this phenomonon. For example, it is useful to know the percentage of students graduating in four years, five years, six years, and so on, instead of being locked into one completion rate. Currently, the federal legislation is inflexible in dealing with this issue but state input might provide useful suggestions in this sensitive area.

- The student unit-record systems and the institution-based data reporting mechanisms now used or under development in most states are typically based on definitions, data dictionaries and reporting formats that help ensure a common understanding of the basic data collected and the information and analysis that results. During the past several years, many state agencies have sought to establish greater comparability and consistency across institutions and across states in the data collected and reported on graduation rates. State roles, in short, are important leverage points to enhance data collection, quality and comparability within a cooperative framework that involves institutions, states and the federal government. States have already been serving this role in varied ways in connection with the coordination of IPEDS data collection and reporting.

Unfortunately, the connections between state-level data collection and reporting on graduation rates, and the new institutional reporting requirements under the federal Student Right-to-Know Act are neither obvious nor direct. The act does not mention existing or potential state roles in either reporting for institutions, or for institutions to use state centralized data bases as resources to meet the federal reporting and disclosure requirements. The act also does not acknowledge state roles in ensuring data quality and comparability, raising the distinct possibility of inconsistency between state and federal level graduation rates.

Since explicit state roles are neither recognized nor sought in the language of the Student Right-to-Know Act, the federal implementation plans to date do not articulate or encourage such involvement. Although many state higher education agencies have been indirectly involved by distributing information and organizing meetings to help their institutions respond to the federal requirements, most are taking a wait-and-see attitude with respect to explicit state reporting roles. In early 1991, only 12 of the 19 states currently reporting graduation rates expected to play a role in reporting or supporting institutional reporting under the federal act. Somewhat more encouraging, nine additional states currently developing such reporting systems are expected to play a role in federal reporting, although they do not yet have the capacity to do so. Many of the remaining states are yet undecided, although others appear to have taken the stance that both institutions and the federal government should be on their own. The disengagement and lack of interest by states is even more pronounced with respect to the reporting of statistics on student intercollegiate athletes and campus crimes and security. This is true despite the fact that states have a more direct interest in both of these areas, and potentially can address the underlying concerns more effectively than the federal government.

The disjuncture in these state and federal actions reflects the particular approach of the act and the inability of the processes of implementation, federal rule-making and compliance to bring these parties together. If this approach continues, one likely consequence will be to make the public information flowing from the federal law much less meaningful than would otherwise be possible. A second consequence may be that the information reported will be peculiarly disconnected from any steps necessary to address the underlying problems, since many of these actions will need to involve the state. Third, and perhaps most troubling, there is a possibility that the uniform but minimalistic federal reporting requirements will displace — in terms of public information and analytic data bases — the existing and rapidly expanding capacity of

states to analyze and report on patterns of student progression through postsecondary education. This can occur as a result of state inaction as well as from federal action.

The process of multi-year implementation of the Student Right-to-Know and Campus Security Act is, fortunately, just beginning. It is not yet too late to take into account the existing knowledge base and state-level capacities and to define appropriate state-level roles. As a start, the IPEDS data coordination model in which a state-level coordinator serves as liaison between institutions and the federal goverment, might be examined. State involvement will serve both the information needs embodied within the Student Right-to-Know legislation and the educational improvements that will be suggested by the resulting statistics. It is our hope that this report will contribute to greater acknowledgement of past state achievements and to enhanced state roles in the future implementation of Student Right-to Know.

Appendix

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